Letters to the Editor.

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The Indian Chemical Service.

IT would, perhaps, have been better if the writer of the leading article entitled "The Organisation of Scientific Work in India," published in NATURE of February 19, had held his hand until he had obtained further information concerning the proposed organisation. The report of the Indian Industrial Commission dealt only with the general question, and left the elaboration of any scheme, if such were considered desirable, to special committees which were to be appointed at a later date. The special committees were to be given a free hand, and were left to approach the problem from an unbiassed point of view.

I was not a member of the Indian Industrial Commission, but there is nothing in the report which indicates that the Commission was in favour of a centralised system of scientific services under Government control such as that which is condemned in the article, and still more emphatically condemned by those who have contributed to the ensuing correspondence. As a matter of fact, if the Industrial Commission had recommended such a course, it would not have been supported for one moment by the Chemical Services Committee, over which I had the honour to preside. Indeed, my colleagues and I, as old investigators, would have been fully alive to the absurdity of any such proposal.

I should like to make my position clear by referring to the conditions we found to prevail in India and to the remedies which we considered necessary in order that the great natural resources of the country might be developed, but I should preface my remarks by saying that I speak for chemistry alone. Other sciences must formulate their own schemes in a manner best suited to their particular requirements.

The problem presented was twofold: First, the position of the chemists in India, and, secondly, the position of the Indian chemical industry. The position of chemists we found to be exceedingly unsatisfactory. There are in all about fifty chemists in India, and most of them are attached to established Government Services, such as forestry, agriculture, medicine, geology, ordnance, and education. In the main, the chemists, although working in the Services, were not attached to them—that is to say, they were in the position of hirelings without any claim to the advantages attaching to Service membership and without the possession of the *esprit de corps* which characterises such membership. They were, moreover, for the most part working in isolated positions in the different provinces, and were without any means by which they could press their claims on the official lay mind. In consequence, they were in many cases receiving totally inadequate salaries, and were, in fact, often regarded as some kind of freak druggist—a point of view which is even more prevalent in India than in England. It was clear that the only way by which the chemist in India could be brought to occupy a financial and social position which his education and training demanded was to place him on an equality with members of other Government Services.

The problem of the chemist was therefore a straightforward one, and was, in our opinion, open to one answer only. The other point, that of the Indian chemical industry, is perhaps rather more complex.

In the first place, there can be no question, I think, that research in chemistry must be divided into pure research and industrial research. It is true that there is no sharp line of division, but in their extreme forms pure research is carried out entirely for the advancement of knowledge, and is without obvious practical bearing, whereas industrial research is done for the advancement and development of industry. The Chemical Services Committee has recommended that pure chemical research should be left to the universities and university institutions, the obvious duty of which is to carry it out. It is not proposed that the chemists attached to university institutions should be normally members of the Service, but it is asked that the universities and university colleges should undertake to train men for recruitment into the Service in the manner recommended by the Committee.

The Committee considers that recruits should have the following training:—

(1) An honours degree in chemistry in the first or second class or its equivalent.

(2) Training in engineering (machine drawing and workshop practice) where such training has not formed part of the course under (1).

(3) One or two years' training in the methods of chemical research under someone competent to train in research.

It is not proposed to institute any system of training within the Service, excepting, of course, such practical training as will normally accrue during the working of the Service, and it is asked that the universities and university institutions should give the necessary training under (3) above. For this purpose it is recommended that maintenance and equipment grants should be given to promising students to enable them to undergo this training subsequent to graduation.

The Committee considered that, provided the trainer were a man of recognised ability, the question of the subject in which the student should be trained could be safely left to him. It agreed that instruction in the methods of chemical research, received after a course such as that given above, was the best training a man could have to develop any initiative and enthusiasm which he might possess, and that a man so trained ought to be able to turn his hand to anything chemical.

In the case of industrial research it must be remembered that chemistry in one form or another underlies most industries, and that in India the following conditions are present: (*a*) Great natural resources; (*b*) lack of scientific chemical help to develop these resources; and (*c*) a public very shy to risk capital without some real assurance of the value of the process it is proposed to finance.

Obviously, the best means for advancing chemical industry is for the firms or combination of firms engaged in the industry to establish research laboratories and to work out their own problems by the aid of their own chemists. This is an ideal which the Indian Chemical Service will be formed to foster. It will, for example, help any member of the Service who wishes to pass out into the industry, and it will second members of the Service for temporary employment to firms who wish to investigate any particular problem. But at the present time there are few manufacturers who employ chemists, and it is evident that some steps are necessary not only to demonstrate to the manufacturer the value of research in connection with his manufacture, but also to demonstrate the possibilities of any particular process to anyone wishing to invest capital and start a new industry.

Who is to do this? There is, we think, only one answer, namely, that, as it is to the interest of the State as well as of the manufacturer to develop

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industry, it is the duty of the State to convince the manufacturer of the value and necessity of research in connection with his work.

The Indian Chemical Service will have research institutes in the centres of industry of every province. These will be in close touch with the works and with works conditions, and deal with questions of immediate practical importance submitted by manufacturers. They will also carry out research work in connection with the establishment of new industries, and develop a process as far as the unit factory scale. In some cases it will be necessary, in order to demonstrate the value of a process, to erect pioneer factories and work them on the complete commercial scale. Each institute will be under a director of research.

A central Imperial institute will be located at Dehra Dun. It will be under the Director-General of the Chemical Service, and contain laboratories for inorganic and physical chemistry, organic chemistry, analytical chemistry, and metallurgical chemistry, each controlled by a deputy-director. Questions involving fundamental research arising out of the work of the provincial institutes will be dealt with here, as well as the initial work in connection with the establishment of new industries. Research work of an All-India character, such as investigations on the utilisation of forest products, will also be done.

The report, which should reach England during the course of the next fortnight, should be consulted for further details. It may be added, however, that there is no official control; the Service will be worked by chemists for chemists. Chemists seconded for service with other Departments will retain their lien on the Chemical Service, but be under the control of the Department to which they have been seconded.

The provincial institutes will not be under the control of the central institute, which will act towards them in an advisory capacity only.

In conclusion, I should add that I have discussed the proposed scheme with eminent Indian men of science and prominent business men in different parts of the Empire, and they have told me that they are prepared to give it their whole-hearted support. Moreover, Sir P. C. Rây, the distinguished professor of chemistry in the College of Science, Calcutta, who was a member of the Committee and attended all its meetings, while stating at the outset that he was opposed in principle to Government Services generally, nevertheless agreed to each paragraph of the report as it was passed in its final form. He signed the report subject to a separate note in which he expresses his general approval of the scheme in the following words: "In conclusion, I desire to state that, although I consider that the days of Government Services are over and that the development of industries by the agency of a Government Service is not the most suitable way of dealing with the problem, yet I agree that, if a Government Service is constituted, the proposals of the Committee represent the best method of constituting and carrying on such a service. It is for this reason that I have attached my signature to a report with the major portion of which I am in substantial agreement."

Jocelyn Thorpe.

I have followed with keen interest the leading article on "The Organisation of Scientific Work in India" in Nature of February 19, and the correspondence thereon by Profs. Soddy and Bateson, Sir Ronald Ross, and others. The note of warning has been sounded not a moment too soon. To me it appears that the Industrial Commission has not been able to make out a very convincing case for the creation of a highly expensive All-India Chemical Service—an elaborate and ordered hierarchy under the almost absolute control of a number of highly paid bureaucrats. The Services degenerate in India, the land of caste, into so many rigid and watertight compartments unamenable to healthy external influence.

The manner in which the work of the Service is to be carried on appears to me to be extremely objectionable. There is to be a Director-General of Research at the Imperial Chemical Institute, with five or six directors at different provincial centres. These officers are to have almost absolute power over the rank and file—the real workers; for not only are the directors to dictate what particular piece of research a worker is to take up, but even the publication of the work is to be subject to the consent of the Board of Control.

For the scheme to be successful the directors must be men who are conversant with almost all the different branches of chemistry, and keep in touch with the most up-to-date advances in their science. Moreover, their minds are to be occupied with swarms of problems awaiting their day to be delivered to the care of the researchers. Lastly, they are to do justice, with the impartiality of a Privy Council Judge, to each individual worker according to his work and accomplishments. Even the greatest chemists of the age would hesitate to acknowledge that they are supermen of this description.

I am afraid that the proposed Service will simply be an asylum for a few officials in favour with the Government who find administrative work much more suited to the taste than bottle-washing and other humdrum work of the laboratory, and want to legalise the exploitation of the brain and labour of the young men just coming out of the universities full of new ideas and enthusiasm for work. We shall have a number of chemists working under a peripatetic director whose claims to the post will be his seniority, which in India often goes hand in hand with incompetence. I am afraid that the so-called research work will lapse into dull, mechanical, routine outturn, and will kill all enthusiasm and initiative on the part of the actual workers. They are even, as Prof. Soddy remarks, "to be deprived of what little satisfaction and independence genuine scientific work for its own sake affords," and in many cases will have to renounce their own work for the propitiation of the directors.

It seems to be supposed that since there is a Viceroy over governors, a governor over a number of magistrates, and a magistrate over a number of petty officials, so there must be an Imperial chemist over a number of provincial directors, directors over deputy-directors, deputy-directors over sub-deputy-directors, and so on. But in the republic of science the idea of such ordered gradation is absurd. Each branch of science, notably chemistry, has now grown so vast that a particular worker, however highly gifted, can honestly tackle and follow intelligently the developments of only a minute fraction of his subject. In the quest after truth and in the exploration of new paths of knowledge every worker has to find out his own way, and it not infrequently happens that a young and unknown worker may achieve much more brilliant results than men who have grown grey in the service of science. What is wanted is co-operation, provision for more ample facilities, and the opening up of better prospects for the earnest-minded and enthusiastic workers.

In India at the present state of her scientific development, the institution of the Chemical Service on the proposed lines will be not simply a blunder, but

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